

PVTx Measurements for Aqueous NaNO₃ Solutions

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The PVTx properties of four aqueous NaNO₃ solutions (0.100, 0.303, 0.580, 0.892 mol×kg⁻¹ H₂O) were measured in the liquid phase with a constant - volume piezometer immersed in a precision liquid thermostat. Measurements were made at ten isotherms between 298 K and 573 K. The range of pressure was from 2 MPa to 40 MPa. The total uncertainty of density, pressure, temperature, and concentration measurements were estimated to be less than 0.06 %, 0.05 %, 10 mK, and 0.014 %, respectively. The accuracy of the method was confirmed by PVT measurements for pure water in the same temperature and pressure range. The experimental and calculated from IAPWS-95 formulation values of densities for pure water show excellent agreement within their experimental uncertainties (AAD=0.03 %). The values of the saturated densities were determined by extrapolating experimental P-ρ data to the vapor-pressure along fixed temperature and composition using interpolating equation. The values of the apparent molar volumes were calculated using measured values of density for solutions and pure water. A polynomial type equation for the specific volumes was obtained as a function of temperature, pressure, and composition by a least-squares method from the experimental data. The AAD between the measured density and the calculated values from this polynomial equation was 0.02 %. The measured values of density were compared with the data reported by other authors.